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CONSTRUCTION AND OPERATION OF A SIMPLE
RADIOTELEGRAPHIC CODE PRACTICE SET.*

(Prepared at request of the States Relations Service, United States Department of Agriculture for use by Boys' and Girls' Radio Clubs.)

Introduction

This pamphlet describes apparatus which may be used for the purpose of learning the radio telegraph code. The apparatus is very easy to set up and operate. It is intended to be used at radio club meeting places or in places where a number of radio students are accustomed to assemble. Those who construct the simple radio receiving sets described in the first two pamphlets of this series will probably hear many signals which are in code. The Code Practice Set is therefore made a part of this series so that the international Morse Code may be learned.

The cost of the complete outfit will be about \$5.70 or, if one constructs the telegraph key, the cost will be reduced to about \$3.60. It is assumed that those who use this outfit have radio receiving sets and can bring their telephone receivers ("phones") to connect to the other apparatus. It is also assumed that it will not be necessary to purchase the table upon which the parts are mounted. It is desirable

*This is the third of a series of pamphlets describing the construction of radio equipment. The two publications which have been issued are Letter Circular 43, "Construction and Operation of a Very Simple Radio Receiving Equipment," and Letter Circular 44, "Construction and Operation of a Two-Circuit Radio Receiving Equipment with Crystal Detector." These describe the construction and operation of simple receiving sets. Subsequent pamphlets will describe the construction of sets with which messages can be received over longer distances. Letter Circular 43 has also been issued in printed form as Bureau of Standards Circular No. 120. "Construction and Operation of a Simple Homemade Radio Receiving Outfit." A copy may be purchased for 5 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

to use telephone receivers which are equipped with headbands.

Essential Parts of Equipment.

The drawing shows the apparatus mounted on a table.

A telegraph key is shown at K or, if desired, an automatic sending machine may be used. The key may be made at home, but the rest of the apparatus should be purchased from an electrical supply house.

R is a porcelain-base circular rheostat having a resistance of about 10 ohms.

D is a dry cell battery.

S is a small switch.

B is a test buzzer of a type which gives a clear musical tone when connected to a battery. The type mentioned in Letter Circular LC 43 will be satisfactory.

C, F, G, and H show clips used for making connections to the telephone receivers T. One clip is shown in detail.

Accessories. - Under this heading are listed:

- (1) Telephone receivers, - furnished by members of the club.
- (2) About 20 feet of No. 18 annunciator (bell) wire, doublepointed tacks for fastening the wire to the table, and screws for fastening the apparatus to the table.
- (3) Parts for the key (if constructed).

Construction of Sending Key.

The expense of purchasing a key may be reduced by making the "strap key" described below. This will work very well, although it is not as satisfactory as a regular telegraph key.

The key is shown in detail in the upper right-hand corner of the

drawing. B is a strip of spring brass about 5 inches long, $\frac{1}{2}$ inch wide and $\frac{1}{32}$ inch thick. Drill a hole in the center of one end of the brass strip. Saw a large sewing-thread spool in half and bolt it to the brass strip as shown in the figure. A flat-head brass bolt is to be preferred. The end of the brass bolt projects a short distance below the strip B, as shown at M and should be filed off flat and smooth. Drill two more holes in the other end of the brass strip. Another thin strip E of brass or copper about 2 inches long and $\frac{1}{2}$ inch wide is fastened near the center of one end of a wooden base by two round-head brass screws. The strip B is now bent into shape, and by means of round-head brass screws is mounted along the center line of the base in such a manner that the projecting brass bolt M is about $\frac{1}{16}$ inch above the center of the brass strip E.

Assembly of Apparatus.

Mount the key near the rear edge of the table and far enough from the end so that the elbow of the operator will be supported. The rheostat, buzzer, switch, and battery are arranged in a convenient manner as shown, and all except the battery are screwed in position. If the connection terminals of the switch S are underneath the base, two pieces of wire should be connected to them before the switch is screwed to the table. In connecting the end of a wire under a screw or nut, first remove the cotton insulation and then bend the wire into the form of a hook in the direction shown by the arrows in the sketch N.

Run a wire from one terminal E of the key to the right-hand binding post Z of the rheostat, scraping off the insulation where the wire is clamped under the binding post. Lead the same wire to a terminal of the buzzer B and connect a wire from the switch S to the other terminal of the

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buzzer. Connect a wire from the other terminal of the switch to one terminal of the battery D. From the other terminal of the battery, a wire is led to the lefthand binding post X of the rheostat, and thence down the center of the table as shown at Y. The other terminal B of the key is connected to a wire W which is also led down the center of the table. The two wires Y and W should be parallel and about five inches apart. The two parallel wires running down the center of the table are clamped under the screws which hold the clips C, F, G, and H (remembering that the cotton insulation must be removed from the wire whenever a connection is desired) and are fastened to the table with double-pointed tacks as shown in the drawing. As many connection clips may be added as conditions require and the length of the table will permit. The free ends of the telephone receiver cords (usually equipped with brass terminals) are fastened to the connection clips as shown at C and H.

Operation.

Close the switch S and adjust the buzzer B until it gives a good tone. Depress the key K and vary the intensity of the signal in the telephone receivers T by rotating the contact arm on the rheostat R.

If a strap key be used, it may be necessary to clean the contacts. This is done by drawing a strip of fine sand-paper between the contact M and the strip E when the key is depressed.

The Code.

It is desirable to have a student, who is familiar with the radio-telegraph code, operate the key K while the other students write the letters down as they are received. Those who are not familiar with the code should first study the tables given below. In radio telegraphy, signals are transmitted by dots and dashes arranged according to the "International Morse

Code", sometimes called the "Continental Code". The International Morse Code is different from the "American Morse Code", which is used on land lines in the United States. The complete International Morse Code with abbreviations is given in the pamphlet "Radio Communication Laws of the United States" obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., price 15 cents; also on a small card (Form 772a and 773a) obtainable without charge from the Bureau of Navigation, Department of Commerce, Washington, D. C., or from any District Radio Inspector.

The International Morse (Radio Telegraph) Alphabet.*

A _ _ _	J _ _ _ _	S _ _ _
B _ _ _ _	K _ _ _	T _
C _ _ _ _ _	L _ _ _ _	U _ _ _
D _ _ _	M _ _ _	V _ _ _ _
E _	N _ _	W _ _ _
F _ _ _ _	O _ _ _ _	X _ _ _ _
G _ _ _	P _ _ _ _	Y _ _ _ _ _
H _ _ _ _	Q _ _ _ _	Z _ _ _ _
I _ _	R _ _ _	

*Because of typing difficulties the dot (.) is shown here as a hyphen (-) and the dash is shown having the length of three hyphens (—) tied together. Thus the letter (C) appears here as _ _ _ _ _ while it would be written _ . _ in the printed forms.

The International Morse Numerals.

1 _ _ _ _ _	6 _ _ _ _
2 _ _ _ _ _	7 _ _ _ _
3 _ _ _ _ _	8 _ _ _ _
4 _ _ _ _ _	9 _ _ _ _
5 _ _ _ _ _	0 _ _ _ _

Punctuation.

Full Stop	(.)	— — — — —
Comma	(,)	— — — — —
An error or erase		— — — — —

Rules for Lengths and Spacing.

A dash is of the same length as three dots. The space between dots and dashes is equal to one dot. The space between two letters is equal to one dash. The space between two words is equal to five dots.

Approximate Cost of Parts.

	Telegraph key (if purchased) about	\$2.50
	Telegraph key (if made at home) about .40	--
1	Porcelain-base circular rheostat - resistance of about 10-ohms	1.00
1	Test buzzer	.75
1	Switch	.25
1	Dry cell battery	.45
4	Clips for making connections to telephone receivers	.40
20	Feet of No. 18 annunciator (bell) wire	.15
	Screws and double pointed tacks	<u>.20</u>
	Total	\$3.60 to \$5.70

